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EXAMINER

BAUMAN, SCOTT E

ART UNIT

PAPER NUMBER

2815

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/25/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/552,441	Applicant(s) IKEZAWA ET AL.	
	Examiner Scott E. Bauman	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 October 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: _____ |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :10/07/2005,07/10/2006,12/19/2006.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "air vent" in claims 21-22, and 32-33 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 1-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.
4. Claims 5 and 7 recites the limitation "melt density" in the claim language. It is unclear what the melt density is, and there is a lack of disclosure in the specifications to be able to determine such. There is insufficient antecedent basis for this limitation in the claim.
5. Claim 15 recites the limitation "selected from an alkyl group having 1 to 6" in the claim language. It is unclear what the "1 to 6." is in reference to. There is insufficient antecedent basis for this limitation in the claim.
6. Claim 18 recites the limitation "represent an alkyl group having 1 to 4." in the claim language. It is unclear what the "1 to 4" is in reference to. There is insufficient antecedent basis for this limitation in the claim.
7. Claims 21-22, 32-33 recites the limitation "thickness of an air vent" in the claim language. It is unclear what the "thickness of an air vent" is or how it is related to the

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epoxy resin molding material. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 21 recites the limitation "structure" in the claim language. It is unclear what the structure is or how it is related to the epoxy resin molding material. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 22 recites the limitation "structure" in the claim language. It is unclear what the structure is or how it is related to the epoxy resin molding material. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 24 recites the limitation "heating reduction ratio" in the claim language. It is unclear as to what the heating reduction ratio is in reference too. There is insufficient antecedent basis for this limitation in the claim.

11. Claim 25 recites the limitation "heating reduction ratio" in the claim language. It is unclear as to what the heating reduction ratio is in reference too. There is insufficient antecedent basis for this limitation in the claim.

12. Claim 28 recites the limitation "warp of a semiconductor device is" in the claim language. It is unclear as to how the warp of a semiconductor device is related to the epoxy resin molding material. There is insufficient antecedent basis for this limitation in the claim.

13. Claim 29 recites the limitation "warp of a semiconductor device is" in the claim language. It is unclear as to how the warp of a semiconductor device is related to the epoxy resin molding material. There is insufficient antecedent basis for this limitation in the claim.

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14. Any claim not specifically addressed above, is being rejected as incorporating the deficiencies of a claim upon which it depends.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 1, 5, 7-10, 13-16 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Osada et al, United States Patent 6,297,306.

17. En re claim 1, Osada et al '306 discloses an encapsulating epoxy resin molding material (Abstract), comprising (A) an epoxy resin (Abstract), (B) a curing agent (Abstract), and (C) an inorganic filler (Abstract), wherein the inorganic filler (C) has an average particle size of 12 um or less (Col 9, lines 55-57) and a specific surface area of 3.0 m²/g or more (Col 9, lines 55-57).

18. En re claim 5, Osada et al '306 discloses the melt density of the epoxy resin (A) is 2 poises or less at 150 degree C (Col 5, lines 40-42).

19. En re claim 7, Osada et al '306 discloses the melt density of the curing agent (B) is 2 poises or less at 150 degree C (Col 7, lines 57-59).

20. En re claim 8, Osada et al '306 discloses the curing agent (B) comprises at least one of a biphenyl phenol resin (Col 7, lines 62-67), an aralkyl phenol resin (Col 7, lines

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62-67), a dicyclopentadiene phenol resin, a triphenylmethane phenol resin (Col 8, lines 1-3), and a Novolak phenol resin (Col 7, lines 62-67).

21. En re claim 9, Osada et al '306 discloses the curing accelerator (Col 10, lines 65-67).

22. En re claim 10, Osada et al '306 discloses the inorganic filler satisfies at least one of the following conditions: the amount of particles having a particle size of 12 μm or less (Col 10, lines 31-34) is 50% or more by weight (Col 10, lines 62-64); the amount of particles having a particle size of 24 μm or less (Col 10, lines 31-34) is 70% or more by weight (Col 10, lines 62-64); and the amount of particles having a particle size of 32 μm or less (Col 10, lines 31-34) is 80% or more by weight (Col 10, lines 62-64); and the amount of particles having a particle size of 48 μm or less (Col 10, lines 31-34) is 90% or more by weight (Col 10, lines 62-64).

23. En re claim 13, Osada et al '306 discloses coupling agent (Col 10, lines 35-49).

24. En re claim 14, Osada et al '306 discloses the coupling agent comprises a silane coupling agent having a secondary amino group (Col 10, lines 35-49).

25. En re claim 15, Osada et al '306 discloses the silane coupling agent (D2), which has the secondary amino group, comprises a compound represented by the following general formula (I): wherein R^1 is selected from a hydrogen atom, an alkyl group having 1 to 6 carbon atoms, and an alkoxy group having 1 to 2 carbon atoms, R^2 is selected from an alkyl group having 1 to 6, and a phenyl group, R^3 represents a methyl or ethyl group, n represents an integer of 1 to 6, and m represents an integer of 1 to 3. (Col 10, lines 35-49).

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26. En re claim 16, Osada et al '306 discloses phosphorus compound (Col 11, lines 1-2)

27. En re claim 23, Osada et al '306 discloses the coupling agent (D) (Col 10, lines 35-49).

Regarding the limitation "the filler coverage ratio of the coupling agent (D) is from 0.3 to 1.0."

These properties would have been inherently satisfied by the prior art because all of the material limitations would have been satisfied. It has been found that, "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present – *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

28. Claims 2 is rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto et al, United States Patent 6,319,619.

En re claim 2, Yamamoto et al '619 discloses an encapsulating epoxy resin molding material (Abstract), comprising (A) an epoxy resin (Col 4, lines 60-65), (B) a curing agent (Col 4, lines 60-65), and (C) an inorganic filler (Col 6, lines 44-45), wherein the inorganic filler (C) comprises 5% or more by weight (Col 6, lines 53-60) of an inorganic filler having a maximum particle size of 63 um or less and particle sizes of 20 um or more (Col 6, lines 44-47).

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29. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

30. Claims 1, 3, 6, 9, 11-14, 21-23 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Sumita et al, United States Patent 6,376,923.

31. En re claim 1, Sumita et al '923 discloses an encapsulating epoxy resin molding material, comprising (A) an epoxy resin (Abstract), (B) a curing agent (Abstract), and (C) an inorganic filler (Abstract), wherein the inorganic filler (C) has an average particle size of 12 um or less (Col 8, lines 42-45) and a specific surface area of 3.0 m²/g or more (Abstract).

32. En re Claim 3, Sumita et al '923 discloses encapsulating epoxy resin molding material, comprising (A) an epoxy resin (Abstract), (B) a curing agent (Abstract), and (C) an inorganic filler (Abstract), the inorganic filler (C) having an average particle size of 15

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um or less (Col 8, lines 42-45) and a specific surface area of 3.0 to 6.0 m²/g (Abstract), and the molding material used in a semiconductor device (Col 1, lines 5-8) having one or more of the following structures (a1) to (d1): (a1) a structure wherein a bump height of a flip chip is 150 um or less (Col 1, lines 16-20).

33. En re claim 6, Sumita et al '923 discloses the epoxy resin (A) comprises at least one of a biphenyl epoxy resin, a bisphenol F epoxy resin, a stylybene epoxy resin, a sulfur-containing epoxy resin, a Novolak epoxy resin, a dicyclopentadiene epoxy resin, a naphthalene epoxy resin and a triphenylmethane epoxy resin. (Col 3, lines 16-20)

34. En re claim 9, Sumita et al '923 discloses a curing accelerator (Col 3, lines 55-56).

35. En re claim 11, Sumita et al '923 discloses the average particle size of the inorganic filler (C) is 10 um or less (Col 8, lines 42-45).

36. En re claim 12, Sumita et al '923 discloses the specific surface area of the inorganic filler (C) is from 3.5 to 5.5 m²/g (Abstract).

37. En re claim 13, Sumita et al '923 discloses a comprising a coupling agent (Col 9, lines 52-60).

38. En re claim 14, Sumita et al '923 discloses the coupling agent (D) comprises (D2) a silane coupling agent having a secondary amino group (Col 9, lines 52-60).

39. En re claim 16, Sumita et al '923 discloses comprising a phosphorus compound (Col 4, lines 27-64).

40. En re claim 21, Sumita et al '923 discloses which has one or more of the following structures (a1) to (f1): (a1) a structure wherein a bump height of a flip chip is

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150 μm or less, (Col 1, lines 16-20). (b1) a structure wherein a bump pitch of the flip chip is 500 μm or less, (c1) a structure wherein an area of a semiconductor chip is 25 mm^2 or more, (d1) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 2 mm or less, (e1) a structure wherein the flip chip has 100 or more bumps, and (f1) a structure wherein a thickness of an air vent when the material is molded is 40 μm or less.

41. En re claim 22, Sumita et al '923 discloses which has one or more of the following structures (a2) to (f2): (a2) a structure wherein a bump height of a flip chip is 100 μm or less (Col 1, lines 16-20). (b2) a structure wherein a bump pitch of the flip chip is 400 μm or less, (c2) a structure wherein an area of a semiconductor chip is 50 mm^2 or more, (d2) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 1.5 mm or less, (e2) a structure wherein the flip chip has 150 or more bumps, and (f2) a structure wherein a thickness of an air vent when the material is molded is 30 μm or less.

42. En re claim 23, Sumita et al '923 discloses the coupling agent (D) (Col 9, lines 52-60).

Regarding the limitation "the filler coverage ratio of the coupling agent (D) is from 0.3 to 1.0."

These properties would have been inherently satisfied by the prior art because all of the material limitations would have been satisfied. It has been found that, "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art

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teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present – *In re Spada*, 911 F.2d 705, 709; 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

43. En re claim 31, Sumita et al '923 discloses semiconductor device (Col 1, lines 5-8) encapsulated by an encapsulating epoxy resin molding material (Abstract) comprising (A) an epoxy resin (Abstract), (B) a curing agent (Abstract), and (C) an inorganic filler (Abstract).

44. Claims 4, 6, 16, 19-20, 28-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Timberlake et al, United States Patent Application Publication 2003/0148109.

45. En re claim 4, Timberlake et al '109 discloses (A) an epoxy resin (Abstract), (B) a curing agent (Abstract), and (C) an inorganic filler (Page 2, paragraph [0012]), and satisfying at least one of the following conditions: the glass transition temperature based on TMA method is 150 degree C or higher (Page 9, Table 1); the bending modulus based on JIS-K 6911 is 19 GPa or less; and the mold shrinkage ratio based on JIS-K 6911 is 0.2% or less.

46. En re claim 6, Timberlake et al '109 discloses the epoxy resin (Page 7, Paragraph [0072])) comprises at least one of a biphenyl epoxy resin, a bisphenol F epoxy resin, a styrene epoxy resin, a sulfur-containing epoxy resin, a Novolak epoxy resin, a dicyclopentadiene epoxy resin, a naphthalene epoxy resin and a triphenylmethane epoxy resin.

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47. En re claim 16, Timberlake et al '109 discloses a phosphorus compound (Page 1, Paragraph [0008]).

48. En re claim 19, Timberlake et al '109 discloses the phosphorus compound (Page 1, Paragraph [0008]) comprises phosphine oxide (Page 1, Paragraph [0011]).

49. En re claim 20, Timberlake et al '109 discloses the phosphine oxide (Page 3, Paragraph [0027]) comprises a compound represented by the following general formula (III) (Page 3, Paragraph [0027]): wherein R^1 , R^2 and R^3 , which may be the same or different, each represent a substituted or unsubstituted alkyl group having 1 to 10 carbon atoms, an aryl group, an aralkyl group, or a hydrogen atom provided that the case that all of R^1 , R^2 and R^3 are hydrogen atoms is excluded (Page 3, Paragraphs [0020-0027]).

50. En re claim 28, Timberlake et al '109 discloses (A) an epoxy resin (Abstract), (B) a curing agent (Abstract), and (C) an inorganic filler (Page 2, paragraph [0012]), and satisfying at least one of the following conditions: the glass transition temperature based on TMA method is 150 degree C or higher (Page 9, Table 1).

Regarding the limitation "the warp of a semiconductor device is 5.0 mm or less."

These properties would have been inherently satisfied by the prior art because all of the material limitations would have been satisfied. It has been found that, "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or

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claims are necessarily present – *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

51. En re claim 29, Timberlake et al '109 discloses (A) an epoxy resin (Abstract), (B) a curing agent (Abstract), and (C) an inorganic filler (Page 2, paragraph [0012]), and satisfying at least one of the following conditions: the glass transition temperature based on TMA method is 150 degree C or higher (Page 9, Table 1).

Regarding the limitation "the warp of a semiconductor device is 2.0 mm or less."

These properties would have been inherently satisfied by the prior art because all of the material limitations would have been satisfied. It has been found that, "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present – *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Claim Rejections - 35 USC § 103

52. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

53. Claims 17-18, 26-27, 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Timberlake et al, United States Patent Application Publication

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2003/0148109 as applied to claim 4 above, and further in view of Ikezawa et al, United States Patent Application Publication 2003/0201548.

54. En re claim 17. Timberlake et al '109 discloses a phosphorus compound.

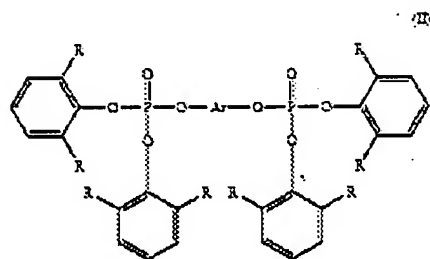
Timberlake et al '109 does not disclose the phosphorus compound comprises a phosphate.

However, Ikezawa et al '548 discloses the phosphorus compound comprises a phosphate (Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

55. En re claim 18. Timberlake et al '109 discloses the phosphorus compound.

Timberlake et al '109 does not disclose the phosphate comprises a compound represented by the following general formula (II): wherein eight R's, which may be the same or different, each represent an alkyl group having 1 to 4, and Ar represents an aromatic ring.



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However, Ikezawa et al '548 discloses the phosphate comprises a compound represented by the following general formula (II): wherein eight R's, which may be the same or different, each represent an alkyl group having 1 to 4, and Ar represents an aromatic ring (Claim 13).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

56. En re claim 26, Timberlake et al '109 does not disclose the semiconductor device having one or more of the following structures (c1), (d1) and (g1): (c1) a structure wherein an area of a semiconductor chip is 25 mm² or more, (d1) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 2 mm or less

However, Ikezawa et al '548 discloses the semiconductor device having one or more of the following structures (c1), (d1) and (g1): (c1) a structure wherein an area of a semiconductor chip is 25 mm² or more (Page 1, paragraph [0019]), (d1) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 2 mm or less (Page 1, paragraph [0018]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin

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molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

57. En re claim 27, Timberlake et al '109 does not disclose the semiconductor device having one or more of the following structures (c2), (d2) and (g2): (c2) a structure wherein an area of a semiconductor chip is 50 mm² or more, (d2) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 1.5 mm or less, and (g2) a structure wherein the encapsulating-material molded area based on a package-molding method is 5000 mm² or more.

However, Ikezawa et al '548 discloses the epoxy resin molding material is applied to a semiconductor device having one or more of the following structures (c2), (d2) and (g2): (c2) a structure wherein an area of a semiconductor chip is 50 mm² or more (Page 13, paragraph [0158]), (d2) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 1.5 mm or less (Page 13, paragraph [0162]), and (g2) a structure wherein the encapsulating-material molded area based on a package-molding method is 5000 mm² or more.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

58. En re claim 32, Timberlake et al '109 does not disclose one or more of the following structures (a1) to (f1): (a1) a structure wherein a bump height of a flip chip is

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150 μm or less, (b1) a structure wherein a bump pitch of the flip chip is 500 μm or less, (c1) a structure wherein an area of a semiconductor chip is 25 mm^2 or more, (d1) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 2 mm or less, (e1) a structure wherein the flip chip has 100 or more bumps, and (f1) a structure wherein a thickness of an air vent when the material is molded is 40 μm or less.

However, Ikezawa et al '548 discloses one or more of the following structures (a1) to (f1): (a1) a structure wherein a bump height of a flip chip is 150 μm or less, (b1) a structure wherein a bump pitch of the flip chip is 500 μm or less (Page 13, paragraph [0160]), (c1) a structure wherein an area of a semiconductor chip is 25 mm^2 or more (Page 13, paragraph [0158]), (d1) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 2 mm or less (Page 13, paragraph [0162]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

59. En re claim 33, Timberlake et al '109 does not disclose the semiconductor device according to claim 29, including one or more of the following structures (a2) to (f2): (a2) a structure wherein a bump height of a flip chip is 100 μm or less, (b2) a structure wherein a bump pitch of the flip chip is 400 μm or less, (c2) a structure wherein an area

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of a semiconductor chip is 50 mm^2 or more, (d2) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 1.5 mm or less, (e2) a structure wherein the flip chip has 150 or more bumps, and (f2) a structure wherein a thickness of an air vent when the material is molded is 30 μm or less.

However, Ikezawa et al '548 discloses the semiconductor device according to claim 29, including one or more of the following structures (a2) to (f2): (b2) a structure wherein a bump pitch of the flip chip is 400 μm or less (Page 13, paragraph [0160]), (c2) a structure wherein an area of a semiconductor chip is 50 mm^2 or more (Page 13, paragraph [0158]), (d2) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 1.5 mm or less (Page 13, paragraph [0162]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

60. En re claim 34, Timberlake et al '109 does not disclose one or more of the following structures (c1), (d1) and (g1) (c1) a structure wherein an area of a semiconductor chip is 25 mm^2 or more, (d1) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 2 mm

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or less, and (g1) a structure wherein the encapsulating-material molded area based on a package-molding method is 3000 mm^2 or more.

However, Ikezawa et al '548 discloses (c1) a structure wherein an area of a semiconductor chip is 25 mm^2 or more (Page 13, paragraph [0158]), (d1) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 2 mm or less (Page 13, paragraph [0162]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

61. En re claim 35, Timberlake et al '109 does not disclose one or more of the following structures (c2), (d2) and (g2) (c2) a structure wherein an area of a semiconductor chip is 50 mm^2 or more, (d2) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 1.5 mm or less, and (g2) a structure wherein the encapsulating-material molded area based on a package-molding method is 5000 mm^2 or more.

However, Ikezawa et al '548 discloses one or more of the following structures (c2), (d2) and (g2) (c2) a structure wherein an area of a semiconductor chip is 50 mm^2 or more (Page 13, paragraph [0158]), (d2) a structure wherein a thickness of a package, in which the semiconductor chip is disposed on a mounting substrate, is 1.5 mm or less (Page 13, paragraph [0162]).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Ikezawa et al '548 epoxy resin molding material for sealing to provide an epoxy resin molding material for encapsulation excellent in fluidity and suitable for a thin semiconductor device (Col 1, paragraph [0001]).

62. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Timberlake et al, United States Patent Application Publication 2003/0148109 as applied to claim 4 above, and further in view of Osada et al, United States Patent 6,297,306.

En re claim 30, Timberlake et al '109 discloses the encapsulating epoxy resin molding material according to claim 4, wherein the content by percentage of the inorganic filler (C) is from 70 to 90% by weight of the epoxy resin molding material.

Timberlake et al '109 does not disclose the content by percentage of the inorganic filler (C) is from 70 to 90% by weight of the epoxy resin molding material.

However Osada et al '306 discloses the content by percentage of the inorganic filler (C) is from 70 to 90% by weight of the epoxy resin molding material (Col 10, lines 62-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Timberlake et al '109 epoxy resin compound with Osada et al '306 epoxy resin composition for sealing because it is suited for semiconductor encapsulation since it is effectively moldable and cures into a part

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having improved reflow crack resistance, moisture resistance, and flame retardance.

And it does not pose a hazard to human health or the environment.

Conclusion

63. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ishii et al, United States Patent Application Publication 2006/0142438 discloses a flame retardant polybutylene terephthalate resin composition and formed article. Ito et al, United States Patent Application Publication 2003/0151032 discloses an epoxy resin molding material. Ikezawa et al, United States Patent Application Publication discloses the epoxy resin composition and general formulas. et al, United States Patent Application Publication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott E. Bauman whose telephone number is 571-270-1443. The examiner can normally be reached on M-TH 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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SEB

A handwritten signature in black ink, appearing to be 'Eugene Lee', written in a cursive style.

EUGENE LEE
PRIMARY EXAMINER